NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

COMPOSTING FACILITY

(no.)
CODE 317

DEFINITION

A facility to process raw manure or other raw organic by-products into biologically stable organic material.

PURPOSE

To reduce the pollution potential of organic agricultural wastes to surface and ground water.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

Organic waste material is generated by agricultural production or processing;

A composting facility is a component of a planned agricultural waste management system;

A composting facility can be constructed, operated and maintained without polluting air and/or water resources; and,

There is a need to improve air quality by reducing the emissions of odorous gases.

CRITERIA

GENERAL CRITERIA APPLICABLE TO ALL PURPOSES

Laws and Regulations. The installation and operation of the composting facility shall comply with all federal, state and local laws, rules and regulations. Laws and regulations of particular concern include those involving zoning, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Facilities that plan to compost animal mortalities must obtain approval of the South Dakota Animal Industry Board.

Composting operations also must obtain approval of the SD DENR Waste Management Program.

The owner or operator shall be responsible for securing all required permits or approvals related to composting, and for operating and maintaining any components in accordance with applicable laws and regulations.

Safety. Safety and personal protection features and practices shall be incorporated into the facility and its operation as appropriate to minimize the occurrence of equipment hazards and biological agents during the composting process.

Facility Siting. Where possible, locate compost facilities so prevailing winds, distances, buildings, landforms, vegetation, etc., minimize odors and protect the visual resource.

The facility must be located on concrete slabs or other appropriate surfaces allowing mud free operation and protection of ground water.

Facilities containing waste from swine, poultry or veal, must be protected from inundation by the 100-year frequency, 24-hour duration precipitation runoff. Facilities containing only other waste, must be protected from inundation by the 25-year frequency, 24-hour duration precipitation runoff.

All facilities located in flood plains must be protected from inundation by 100-year frequency, 24-hour duration runoff.

Direct surface runoff away from the compost facility. Direct contaminated runoff from compost facilities to an appropriate storage or treatment facility for further management.

Compost Mix. Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.

Carbon-Nitrogen Ratio. The initial compost mix shall result in a carbon to nitrogen (C:N) ratio between 25:1 and 40:1. Compost with a greater carbon to nitrogen ratio can be used if nitrogen immobilization is not a concern.

Carbon Source. A dependable source of carbonaceous material with a high C:N ratio shall be stored and available to mix with nitrogen rich waste materials.

Bulking Materials. Add bulking materials to the mix as necessary to enhance aeration. Bulking material may be carbonaceous material used in the mix or a non-biodegradable material.

Moisture Level. Maintain 40 to 65 percent moisture (wet basis) in the compost mix throughout the compost period.

Facility covers may be required to control moisture and provide a suitable product.

Temperature of Compost Mix. Manage the compost to attain and then maintain the internal temperature for the duration required to meet management goals.

When management goals include reducing pathogens, the compost shall attain a temperature greater than 130^{o}F (average throughout the compost mass) for at least 5 total days.

Turning/Aeration. The frequency of turning/aeration shall be appropriate for the composting method used, and to attain the desired amount of moisture removal and temperature control while maintaining aerobic degradation.

Facility Type. Selection of the composting facility/method shall be based on availability of raw material, equipment, labor, time, land available, and desired quality of final compost.

Facility structural elements such as permanent bins, concrete slabs, and roofs shall meet the requirements of Conservation Practice Standard 313, Waste Storage Facility.

Facility Size. Size the compost facility to accommodate amounts of raw material, active composting, and curing space. Facility dimensions must accommodate loading, unloading, and aeration equipment.

Facilities for composting dead animals shall be sized for normal mortality losses. If records are not available, locally established mortality rates for the type of operation shall be used.

Compost Period. Continue the composting process long enough that the compost mix can be safely stored without undesirable odors. It shall also possess the desired characteristics for its use, such as lack of noxious odor, desired moisture content, level of decomposition of original components and texture. The compost period shall involve primary and secondary composting as required to achieve these characteristics.

Test the finished compost as appropriate to assure required stabilization has been reached.

Use of Finished Compost. Land application of finished compost shall meet South Dakota Natural Resources Conservation Service Practice Standards Nutrient Management (590) and Waste Utilization (633).

CONSIDERATIONS

Develop an initial compost mix with a carbon to nitrogen ratio of at least 30:1 to reduce odors. Minimize odors and nitrogen loss by selecting carbonaceous material that, when blended with the nitrogenous material, provides a balance of nutrients and porous texture for aeration.

A chemical neutralizing agent may be used to reduce odors where necessary.

Maximize solar warming by aligning piles north to south configured with moderate side slopes. Prevent ponding and sogginess by not locating piles (windrows) across the slope.

Protect compost facilities from the wind to help prevent excess drying of the compost.

PLANS AND SPECIFICATIONS

Plans and specifications shall meet this standard and shall include requirements needed to achieve its purpose.

OPERATION AND MAINTENANCE (O&M)

Develop an O&M Plan for use by the owner/operator that is consistent with the purposes and design life of this practice. The plan must include:

Recipe ingredients and the sequence that they are to be layered and mixed.

How to manage the compost piles for temperature, odor, moisture, and oxygen. Specify adjustments needed throughout the composting period.

Safety requirements for operation. Closely monitor temperatures above 165^{o}F. Immediately cool piles that are above 185^{o}F.

The O&M Plan shall state that composting is a biological process that requires both art and science for success. Some trial and error may be needed in the start-up of a new facility.

REFERENCES

Northeast Regional Agricultural Engineering Service, Cooperative Extension "On-Farm Composting Handbook," NRAES-54.